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⑮ 発明の名称 抄紙の製造方法

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明 細 書

1. 発明の名称

抄紙の製造方法

2. 特許請求の範囲

1. パルプ分散液から抄紙網版を用いて透かし画像を有する抄紙を製造する際、使用する画像付き網版の局部開口面積率が画像の濃淡に対応し、かつ、少なくとも5%以上となるように透水孔が分布した抄紙網版を用いることを特徴とする透かし画像を有する抄紙の製造方法。

2. 抄紙網版として、強度及び耐久性を備えている80-150メッシュの支持用平板状網に感光性樹脂層を設けて感光性樹脂版を作製し、この樹脂版上に画像型紙または画像の濃淡に対応したポジフィルム、及び透光面積率が5-40%の網点状シートを載せ、該シートの表面から露光・焼付けし、非感光部の感光樹脂を溶出・除去した抄紙網版を用いることを特徴とする特許請求の範囲第1項の抄紙の製造方法。

3. 網点状シートとしてコンタクトスクリーン

を用いることを特徴とする特許請求の範囲第2項の抄紙の製造方法。

4. 抄紙溶液のパルプに対して増粘剤を0.3-3質量%加えた抄紙溶液を用いることを特徴とする特許請求の範囲第1項の抄紙の製造方法。

3. 発明の詳細な説明

(発明の利用分野)

本発明は多種多様な透かし画像、さらに濃淡がある透かし画像を有する抄紙の製造方法に関する。

(従来の技術)

従来、透かし画像を有する抄紙の製造方法としては抄紙網に画像の型に切り取った型紙を接着する方法、合成樹脂又は金属繊維で構成された平板状網版に感光性樹脂液を塗布し、乾燥した感光性樹脂版に画像を撮影したモノクロフィルムを圧着し、これに光を照射し焼付けした後、未感光部分の樹脂を溶解除去した網版を抄紙シリンダーに巻ねて抄紙する方法が知られている。

(発明が解決しようとする問題点)

しかしながら、これらの方法はいずれも透かし部には抄紙パルプ液が通過しないため、透かし部が広い面積の場合は連続した紙層を形成できないため、一回の抄紙工程では希望する画像を有する透かし入り抄紙を製造することが出来ず、あらかじめ透かし部分に相当する薄い紙層を準備し、その上に非透かし部分の層を重ねて抄紙する方法が行われていた。

(問題点を解決する手段)

本発明者らは前記の問題点を解決するために鋭意検討した結果、透かし部に相当する網部分にも透水孔を設けることにより抄紙液が行きわたり、抄紙の透かし部分も画像の濃淡に応じて連続した紙層を形成する事を見だし本発明に到達した。

即ち、本発明は、パルプ分散液から抄紙網版を用いて透かし画像を有する抄紙を製造する際、使用する画像付き網版の局部開口面積率が画像の濃淡に対応し、かつ、少なくとも5%以上となるように透水孔が分布した抄紙網版を用いることを特徴とする透かし画像を有する抄紙の製造方法に関

し、更に具体的には、抄紙網版として60-150メッシュの支持用平板状網に感光性樹脂層を設けた感光性樹脂版を作製し、この樹脂版上に画像型紙または画像の濃淡に対応したポジフィルム、及び遮光面積率が5-40%の網点状シート或はコンタクトスクリーン等を載せ、表面から露光・焼付けし、非感光部の感光樹脂を溶出・除去した抄紙網版を用い、更に、好ましくはポリエチレンオキサイド等の増粘剤を加えて粘度調節した抄紙液を用いることを特徴とする抄紙の製造方法に関する。

本発明において開口面積率は次の式で算出される。

$$\text{開口面積率} = B / (A + B)$$

A: 感光製樹脂層で覆われている面積

B: " " 覆われていない面積

A + B: 網版の全面積

本発明に於て感光性樹脂版の支持用平板状網としてはナイロン、ポリエステル等の合成繊維あるいはステンレススティール、黄銅、等の金属繊維で

構成された平板状網版などで、網目の大きさは概ね60-150メッシュ、オープンエリア率(非繊維部分面積率)が35-50%のものが好適に利用出来る。支持用平板状網のメッシュが60未満のものは樹脂層が破損し易く、又、150を超えるものは抄紙液の通過抵抗が大きく厚い紙層部分の抄紙が困難となるので好ましくない。又、本発明に用いられる感光性樹脂としては露光前は可溶性であり、露光により耐水性樹脂に硬化するものであればよく、例えばジアゾ系感光乳剤、重クロム酸系感光乳剤等が挙げられる。

又、露光・焼付け時に用いられる網点状シートとしてはプラスチックフィルム、ガラス板等の透明シート状物に点状遮光性図形を概ね等間隔に配列させたシート状物が挙げられる。該シートの遮光面積率は概ね5-40%のものが好適に用いられる。5%未満ではその部分に抄紙液が通過できず安定した連続紙層と成りにくく、又、40%を超えると抄紙液の通過量が多く本来の目的である図柄が表現出来無くなり好ましくない。配列され

る点状遮光性図形は円盤状、楕円状、星型、四角等その形状の孔を抄紙液が通過出来るものであればよい。

又、露光・焼付け時に用いられるコンタクトスクリーンは、画像の濃度が階調を有するものであるとき、その局部の濃淡に応じて前記樹脂版に照射される露光量を調節してその局部の硬化面積を変化させるために用いられ、コンタクトスクリーンを用いて作製された抄紙網版を用いて得られた抄紙は濃淡を有する透かし画像がよく表現される。

又、本発明において用いられる抄紙液は通常抄紙用として用いられているものでもよいが、ポリエチレンオキサイド、ポリアクリルアミド等のような増粘剤を用いて1.5-4.0c.p.(20℃)の粘度に調整したものを用いると濃淡画像が鮮明に表現されるので好ましい。

本発明の方法により抄紙された透かし画像に樹脂を含浸させると更に画像が鮮明になる。

(実施例)

以下に実施例を用いて本発明を具体的に説明す

るが、本発明はこれらの例に限定されるものではない。

実施例1

縦1.1m、横3.8mの80メッシュのテトロン製スクリーンに感光性樹脂(商品名:アクアコート)を全面に乾燥重量で30g/㎡になるように塗布し乾燥して未感光樹脂板とした。この樹脂板上に順に直径200mmの円盤状の黒い図柄を写真撮影したモノクロポジフィルム及び直径260μの黒い網点が縦横に配列され、平均透光面積率が30%で線数が30本/inchの網点状シートを重ね、その上方から焼付け用アーク灯照明により露光焼付けした後、ポジフィルム及び網点状シートを取り除いて未感光部の感光性樹脂を溶出取り除き画像付き網版を作製した。

この網版の画像に相当する部分には樹脂は残存しておらず、支持体の80メッシュのテトロン製スクリーンが露出しており、オープンエリア率は約50%であった。又、この網版の非画像部分は網点状シートの網点部のみ樹脂が溶出して開口

る他は実施例1と同じ様な抄紙液を用い、又、実施例1と同じ様にして画像入り抄紙を得た。

得られた乾燥抄紙の平均米坪は55g/㎡であり、非画像部の厚さは135μ、薄い画像部は約95μであり、鮮明な円の透かし模様の抄紙であった。

実施例3

縦1.1m、横3.8mの120メッシュのテトロン製スクリーンに実施例1と同じ様にして未感光樹脂板を作製した。この樹脂面上に順に露液を有する風景画像を写真撮影したモノクロフィルム、階調用のコンタクトスクリーン(50線/inch)を重ね、実施例1と同様にして露光・焼付けし水洗して露液画像付き網版を作製した。

この網版の非画像部分の開口面積率は25%、又、画像部の最も濃い部分の開口面積率は100%で最も薄い部分は7%であった。このような網版を用いて実施例1と同様にして抄紙し平均米坪60.5g/㎡の乾燥抄紙を得た。この抄紙は最も濃い(厚い)部分は137μ、最も透かしの(薄い)部分は49μで原画の濃淡によく対応した

面積率は約30%であった。このような網版を直径1.2mの円網シリンダーのステンレスワイヤー(80メッシュ、空率率30%)の上に巻き固定して円網抄紙機バットに納め、叩解度20°SRのシ材バルブをスラリーに対バルブ固形分0.5%の粘剤:ポリエチレンオキサイドを加え、溶液の固形分濃度に対して0.3%になるように調節した抄紙液を通して抄紙した。

得られた乾燥抄紙の平均米坪は60.3g/㎡であり、厚い画像部は149μ、薄い非画像部は90μであり、広い面積の透かし状比画像部も殆ど厚みむらがなく、その中で画像部が鮮明に浮かび上がり、美的感覚が優れた透かし入り抄紙を得ることが出来た。

実施例2

実施例1において、画像が線幅約30mm、直径600mmの円であるモノクロネガフィルムを用いた以外は実施例1と全く同じ様にして画像付き網版を作製した。

又、抄紙液として粘剤の添加量が0.7%であ

る濃度階調に優れた美的感覚が優れた抄紙であった。

比較例1

実施例1においてポジフィルムを重ねて用いた網点状シートを用いないで焼付けを行った画像付き網版を用いたこと以外は実施例1と全く同じ様にして抄紙した。得られた乾燥抄紙は薄い非画像部分は殆ど紙状にならず全体として実用性に乏しいものであった。

比較例2

30メッシュのテトロン製スクリーンを用いた以外は実施例1と同様にして抄紙を行った。このため支持体の網目が大きいと感光硬化樹脂が支持体より脱落し、得られた像が原稿どうりに再現されなかった。又、200メッシュのものを用いた場合は支持体そのものの強度がなく長時間連続して抄紙することが出来なかった。

比較例3

実施例1及び3に於て、増粘剤を用いないで抄紙を行った。透かし及び画像入り抄紙は得られたが非画像部と画像部の境界が増粘剤を用いた場合

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に比較して不明確に成り図鮮明さが得られなかつた。

特許出願人 株式会社 興人

SPECIFICATION

1. TITLE OF THE INVENTION

PROCESS FOR MAKING PAPER

2. CLAIMS

1. A process for making a paper having a watermark image from a pulp dispersion by use of a paper-making halftone plate, wherein a local open area ratio of the halftone plate with the image to be used corresponds to density of the image and a paper-making halftone plate having filter holes distributed so as to be 5% or more is used.

2. The process for making the paper according to claim 1, wherein there is used, as the paper-making halftone plate, a paper-making halftone plate obtained by providing a photosensitive resin layer on a supporting flat halftone of 60 to 150 mesh possessing strength and durability to manufacture a photosensitive resin plate, placing on the resin plate an image pattern paper or a positive film corresponding to density of the image and a halftone-like sheet having a light shielding area ratio of 5 to 40%, exposing and printing the sheet from the surface, and dissolving and removing the photosensitive resin at a non-exposed part.

3. The process for making the paper according to claim 2, wherein a contact screen is used as the halftone-like sheet.

4. The process for making the paper according to

claim 1, wherein a paper-making solution containing a thickener added in an amount of 0.3 to 3% by weight based on pulp in the water-making solution is used.

3. DETAILED DESCRIPTION OF THE INVENTION

(Application Field of the Invention)

The present invention relates to a process for making papers having a variety of watermark images, furthermore watermark images having different density.

(Conventional Art)

Hitherto, as processes for making papers having watermark images, there are a process of adhering a pattern paper cut into an image pattern to a paper-making halftone and a process of applying a photosensitive resin solution onto a flat halftone plate composed of a synthetic resin or a metal fiber, attaching a monochrome film having an image shot thereon to the dried photosensitive resin plate by pressure, irradiating it with a light to effect printing, subsequently overlaying on a paper-making cylinder the halftone plate from which the resin at a non-exposed part is removed, and conducting paper-making.

(Problems to be Solved by the Invention)

However, in all these processes, since a paper-making pulp solution does not pass through the watermark part, a continuous paper layer cannot be formed in the case that the watermark part has a wide area, so that a paper with a watermark having a desired image cannot be made in one paper-making step. Therefore, a process of preparing a

thin paper layer corresponding to the watermark part beforehand and conducting paper-making by overlaying a layer of a non-watermark part thereon has been carried out. (Means for Solving the problems)

As a result of extensive studies for solving the above problem, the present inventors have found that a paper-making solution penetrates all over by providing filter holes even at a halftone part corresponding to a watermark part and a continuous paper layer according to density of an image is formed even at the watermark part of a paper and thus they have accomplished the present invention.

Namely, the present invention related to a process for making a paper having a watermark image from a pulp dispersion by use of a paper-making halftone plate, wherein a local open area ratio of the halftone plate with the image to be used corresponds to density of the image and a paper-making halftone plate having filter holes distributed so as to be 5% or more is used. More specifically, it relates to a process for making a paper, wherein there is used, as the paper-making halftone plate, a paper-making halftone plate obtained by providing a photosensitive resin layer on a supporting flat halftone of 60 to 150 mesh possessing strength and durability to manufacture a photosensitive resin plate, placing on the resin plate an image pattern paper or a positive film corresponding to density of the image and a halftone-like sheet or a contact

screen having a light shielding area ratio of 5 to 40%, exposing and printing the sheet from the surface, and dissolving and removing the photosensitive resin at a non-exposed part, and more preferably wherein a paper-making solution whose viscosity is controlled by adding a thickener such as polyethylene oxide is used.

In the present invention, the open area ratio is calculated according to the following equation.

$$\text{Open area ratio} = B/(A+B)$$

A: Area covered with photosensitive resin layer

B: Area not covered with photosensitive resin layer

A+B: Total area of halftone plate

In the present invention, as the supporting flat halftone for the sensitive resin plate, use can be suitably made of a flat halftone composed of a synthetic fiber such as nylon or a polyester or a metal fiber such as stainless steel or brass, whose mesh size is from about 60 to 150 mesh and whose open area ratio (area ratio of non-fiber part) is from 35 to 50%. When mesh of the supporting flat halftone is less than 60, the resin layer tends to be broken and when it exceeds 150, penetration resistance of the paper-making solution is large and hence it becomes difficult to conduct making-paper at a thick paper layer part, so that the cases are not preferable. Moreover, the photosensitive resin for use in the present invention may be any one as far as it is soluble before light-exposure and is cured

into a water-resistant resin by light-exposure and examples thereof include diazo photosensitive emulsions, bichromate photosensitive emulsions, and the like.

Furthermore, as the halftone-like sheet for use at the exposure and printing, there may be mentioned transparent sheet articles in which dot-like figures are arranged at even intervals on transparent sheet articles such as plastic films, glass plates, and the like. Those having a light shielding area ratio of about 5 to 40% are suitably employed. When the ratio is less than 5%, the paper-making solution cannot pass through the part and a stable continuous paper layer is hardly formed. When it exceeds 40%, the amount of the paper-making solution passing through is too large to express the primarily aimed figure, so that the cases are not preferable. The dot-like light-shielding figure to be arranged may be any of disk-like shape, elliptic shape, star-like shape, rectangular shape, and the like, as far as the paper-making solution can pass through holes having the shape.

In addition, the contact screen for use at the exposure and printing is used for controlling a dose of light-exposure with which the above resin plate is irradiated according to the density of the local part to change a cured area of the local part when the density of the image has gradation. The paper obtained by use of a paper-making halftone plate prepared using the contact screen can well express a watermark image having different

density.

Moreover, the paper-making solution for use in the present invention may be one ordinary used for paper-making but it is preferred to use one whose viscosity is adjusted to 1.5 to 4.0 cp (20°C) using a thickener such as polyethylene oxide or polyacrylamide since an image having different density is clearly expressed.

The image is further clarified by impregnation of the watermark image made by the process of the present invention with a resin.

(Examples)

The following will specifically describe the present invention with reference to Examples but the invention is not limited these Examples.

Example 1

A photosensitive resin (Trade name: Aquacoat) was applied onto the whole surface of a Tetron screen of 80 mesh having a size of 1.1 m by 3.8 m so as to be 30 g/m² by dry weight and dried to form an unexposed resin plate. A monochrome positive film on which a disk-like black figure having a diameter of 200 mm was shot and a halftone-like sheet where black halftone having a diameter of 260 μ was arranged lengthwise and crosswise, an average light shielding area ratio was 30%, and the number of lines was 30 lines/inch were overlaid on the resin plate in this order, the plate was exposed and printed by an arc lamp illumination from above, and then the positive film and the

halftone-like sheet were removed and the photosensitive resin at a non-exposed part was dissolved and removed, whereby a halftone plate with an image was manufactured.

The resin did not remain at the part corresponding to the image of the halftone plate and the Tetron screen of 80 mesh as the support was exposed, the open area ratio being about 50%. Moreover, at a non-image part of the halftone plate, the resin was dissolved only at the halftone part of the halftone-like sheet, the open area ratio being about 30%. Such a halftone plate was attached onto the stainless wire (80 mesh, void ratio of 30%) around a cylinder-mold cylinder having a diameter of 1.2 m and fixed thereto and the whole was placed in a vat of a cylinder paper machine. A paper-making solution obtained by adding a thickener: polyethylene oxide to a slurry of an L-wood pulp having a degree of beating of 20°SR in an amount of 0.5% based on pulp solid mass and controlling so as to be 0.3% based on the solid mass concentration was passed through the machine to make a paper.

An average meter weight of the resulting dry paper was 60.3 g/m² and it was possible to obtain a paper with a watermark excellent in aesthetic sense having a thick image part of 149 μ and a thin non-image part of 90 μ with hardly any uneven thickness even at a large area watermark-like specific image part wherein the image part was clearly come up.

Example 2

A halftone plate with an image was manufactured in exactly the same manner as in Example 1 except that a monochrome negative film where the image was a circle having a line width of about 30 μ m and a diameter of 600 μ m was used in Example 1.

Moreover, a paper-making solution similar to that of Example 1 was used as a paper-making solution, except that the amount of the thickener was 0.7% and a paper with an image was obtained in the same manner as in Example 1. An average meter weight of the resulting dry paper was 56 g/m² and it was a paper with a watermark of a clear circle having a thickness of a non-image part of 135 μ m and a thin image part of about 95 μ m.

Example 3

An unexposed resin plate was manufactured in the same manner as in Example 1 using a Tetron screen of 120 mesh having a size of 1.1 m by 3.8 m. A monochrome film on which a landscape image having different density was shot and a contact screen (50 lines/inch) for gradation were overlaid on the resin plate in this order and the plate was exposed and printed in the same manner as in Example 1 and washed with water, whereby a halftone plate with an image having different density was manufactured.

The open area ratio at a non-image part of the halftone plate was 25%, while the open area ratio at the thickest part in an image part was 100% and that of the thinnest part was 7%. Using such a halftone plate, paper-

making was conducted in the same manner as in Example 1 to obtain a dry paper having an average meter weight of 60.5 g/m². The paper was a paper excellent in aesthetic sense having an excellent density gradation well corresponding to the original picture, which has the thickest part of 137 μ and the most watermarked (thinnest) part of 49 μ .

Comparative Example 1

Paper-making was conducted in exactly the same manner as in Example 1 except that a halftone plate with an image wherein printing was conducted using no halftone-like sheet to be used for overlaying onto the positive film. The resulting dry paper was poor in practicability as a whole since the thin non-image part hardly formed a paper.

Comparative Example 2

Paper-making was conducted in the same manner as in Example 1 except that a Tetron screen of 30 mesh was used. Accordingly, since the mesh size of the support was large, the photosensitive curable resin dropped out of the support and the resulting image was not a reproduced one the same as the original. Moreover, when a screen of 200 mesh was used, strength of the support itself is weak and hence continuous paper-making for a long time was impossible.

Comparative Example 3

Paper-making was conducted using no thickener in Examples 1 and 3. A paper with a watermark and an image was obtained but a border between a non-image part and an

image part became unclear as compared with the case where the thickener was used and clearness of the image was not obtained.

Applicant: Kohjin Co., Ltd.

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